Center Independent Research & Development: JPL IRAD

Wireless Applique for Integration and Test

Completed Technology Project (2015 - 2018)

Project Introduction

This project investigates and develops wireless communications technologies as alternatives to traditional cabled data connections between spacecraft subsystems.

This effort has been formulated with two distinct, overarching objectives: (i) Retirement of key risks in the adoption of radio frequency (RF) wireless technologies to spacecraft test and operational environments, (ii) Near-term infusion of techniques, designs and technologies to the spacecraft I&T environment to address the ATLO/GSE harness mass and cable routing complexities.

Three of the primary risks addressed under this effort are: (i) communications link reliability and security, (ii) scalability and (iii) electromagnetic compatibility (EMC).

Anticipated Benefits

This project develops cross-cutting technologies that reduce or eliminate complicated and bulky cabling used for spacecraft subsystem data interconnects as well as those used during integration and test. In particular, short-range, wireless communications provides benefits in cable mass savings, reduction of EGSE (Electrical Ground Support Equipment) cable routing complexities, test access to deeply integrated subsystems, flexibility in overall spacecraft design as well as late modifications and enables dissimilar redundancy.

Of these benefits, the one most applicable to funded NASA missions is providing capability for late modifications. Such a benefit could manifest itself during the spacecraft design and development phase when cable mass or routing limitations could result in de-scoping an instrument or subsystem.

For unfunded and planned missions, wireless data interconnects provide benefits in terms of increased spacecraft design options. For example, during these missions' formulation and early design phases, wireless technologies can be leveraged to increase flexibility in instrument or subsystem emplacement options or to lower overall mass sufficiently to enable incorporation of addtional payloads.

The research and development of cross-cutting wireless, intra-spacecraft communications technologies provides proof-of-concept and risk mitigation to the Commercial Space Industry in further developing and implementing such systems for improving their own satellites and spacecraft.

A potentially key benefit offered by the development of wireless interconnect technology for spacecraft fielded by Other Government Agencies is modular flexibility. For spacecraft that are developed for a specific mission type, cable-free/reduced insertion/addition of instruments, sensors or subsystems can

JPL_IRAD_Activities Project

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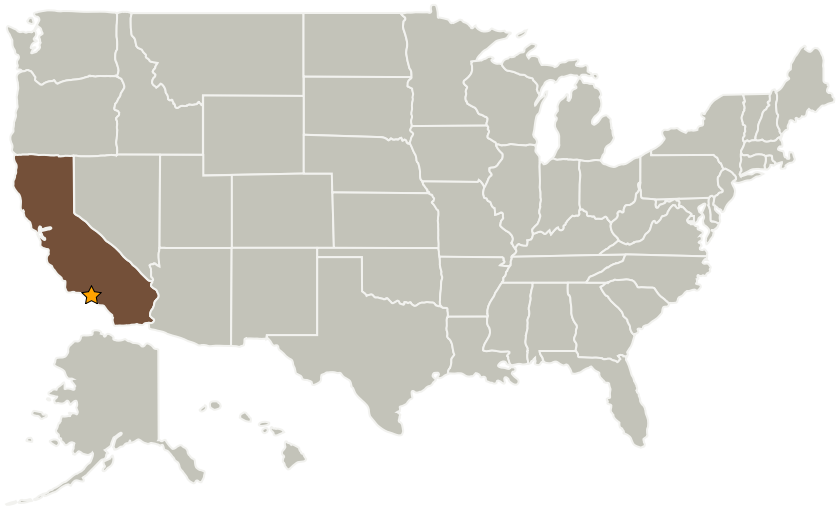
improve the cost-effectiveness and simplicity of upgrades over time for satellite systems built around a family of spacecraft.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

Project Management

Program Manager:

Fred Y Hadaegh

Project Manager:

Fred Y Hadaegh

Principal Investigator:

Norman E Lay

Co-Investigators:

Kristoffer N Bruvold
Pablo Narvaez
Clayton M Okino

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Images

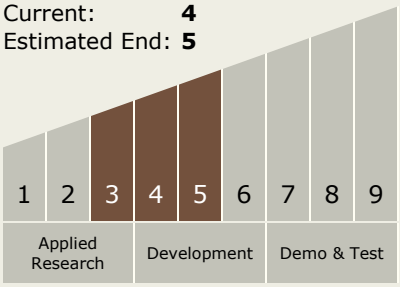
JPL_IRAD_Activities Project Image
JPL_IRAD_Activities Project
(https://techport.nasa.gov/image/28019)

Links

SMART CABLING: WIRELESS APPLIQUÉ FOR INTEGRATION AND TEST
(no url provided)

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **5**



Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.7 Point-of-Load Power Converters

Target Destinations

The Moon, Earth, Others Inside the Solar System

Supported Mission Type

Push